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meet the objection in this direction which is likely to occur to many minds. Dr. Emmons, as most no doubt are aware, endeavored to show that limestones occur as intrusive masses as well as in stratified beds. Commencing my study of the limestones connected with the foliated series of rocks in the light of this view, I finally became convinced in 1861, and during the same year set forth in a series of lectures, that some of these limestones have a vein-like structure, and should be regarded as true vein-stones.

Such limestones are to be met with in association with the foliated rocks both of eastern and western Vermont, and in various parts of Massachusetts. They also occur among the Adirondacks. Limestones of this character, hand-specimens of which cannot be distinguished by the naked eye from specimens of stratified Silurian limestones, are likewise found in Vermont and elsewhere in the form of dikes. In most of these cases close examination shows that the dike-like masses were formed in the vein-like way by gradual deposition extending from the enclosing walls toward the centres of what once were cavities. Similar masses of calcareous vein-stone are to be met with in St. Lawrence County, N. Y., and in some other places, penetrating beds of sandstone.

These, and similar cases which might be readily cited, are suited to remove the objection that limestones are always stratified rocks. At the same time the occurrence of undoubled *Eözoon Canadense* in calcareous vein-stones of eastern Massachusetts tends not only to disprove the animal origin of the specimens from the localities under consideration, but also to involve in doubt the organic character of the Eozoon generally.

On the Eozoon Limestone of Eastern Massachusetts. — By Prof. J. B. Perry.

Having about ten years ago, made out that some of the limestones associated with the foliated rocks in Vermont and New York, are vein-stones, I have ever been skeptical in regard to the supposed organic nature of the Eozoon. As I had more recently satisfied myself that limestones in Stoneham, Newbury, and several other places in eastern Massachusetts are also vein-rocks, I at once, on the announcement of the discovery of Eozoon in the limestones of Newbury, discredited its assumed organic character, on the ground of its occurrence in calcareous masses of a vein-like origin. On hearing of a like discovery in Chelmsford, and seeing a specimen, I had a similar conviction; and this I immediately expressed in one of the lectures which I was then delivering in course, and was able fully to confirm by personal examination, on visiting the quarry a few months later, in company with my friend Mr. Burbank, of Lowell, who had before and has since devoted himself assiduously to the study of the rocks in his neighborhood.

The limestones in which the so-called Eozoon is found, as should be borne in mind, do not occur in a continuous line, as is usual in stratified rocks. They are isolated masses, often having a lenticular shape, and are found only at irregular intervals. Those at Chelmsford occupy, or rather occupied (for they have been largely removed) cavities, or oven-shaped spaces, formed by the disturbance of the overlying gneiss. In places, the gneiss now so overarches some of the cavities, and it evidently once so overarched them all, as to make it impossible that fossils, or any other solid foreign bodies, could have been carried in and deposited in a continuous series, beneath the summits and all along the sides of the arches.

Again, these calcareous masses have that banded structure which is peculiar to veins. There is, moreover, connected with this structure a succession of minerals, showing that the deposition must have taken place gradually, one layer succeeding another from the sides of the cavities toward the centres, until the central spaces were finally filled. Once more, these layers exactly conform with the most abrupt irregularities of the enclosing gneiss, while portions of the limestone in given instances clearly ramify, in a vein-like way, the walls which form the cavities.

Such are some of the points characteristic of these calcareous vein-stones. That the limestones of Chelmsford have truly a vein-like structure should be evident from what has been said, and especially, from an examination of the same and of similar rocks as they occur in place. The question as to their origin, whether by infiltration, segregation, or sublimation, I leave undiscussed for the present.

Now it is a fact, that genuine Eozoon — Eozoon which is recognized as genuine by those who hold to its organic nature — actually occurs in these limestones.

Thus, an enigma is asking for solution — an enigma involving difficulties not easily answered, and imposing a task not readily performed, in consistency with the commonly received views of this strange fossil form. Indeed, the fact that genuine Eozoon occurs in these calcareous vein-stones, under the conditions indicated, raises an important question which I leave those conversant with Eozoon structure to solve as best they are able. While it indicates that the so-called Eozoon of Chelmsford is not of animal origin, it at the same time casts discredit upon the organic character of the "Eozoon" generally, and fixes the burden of proof upon its advocates. It also certainly suggests that the resemblance which the "Eozoon" has to animal structure is, like that of Dendrites to vegetable forms, merely the result of chemical agency.

REMARKS ON THE GEOLOGICAL MAP AND SECTION OF THE ROCKS OF MISSOURI.—BY PROF. G. C. SWALLOW.

It was his object to put on record some of the general results of the Geological Survey of Missouri made by himself and his able assistants (one of whom, Dr. B. F. Shumard, is now dead.) Since the interruption of the survey by the late civil war there has been no opportunity offered for the publication of the results.

The survey was most minute and carefully made, and the results the same as represented by the section and map before us. The boundaries of the formation save in eight or thirteen counties are accurate and all the formations are as delineated by the section running through all the great systems known to American geology.

Some of the results in Economical Geology were mentioned.

There are twenty-seven thousand square miles of Coal Measures containing at least twenty coal beds, one at least of the block coal. Large deposits of specular, hæmatite, bay and spathic ores were mentioned. The mineral regions containing mines of lead, zinc, cobalt, nickel and copper cover an area of about eight thousand square miles; all but two hundred square miles in the Magnesian Limestone series (of the Potsdam and Calciferous ages) and two hundred square miles at Granly in the lower Carboniferous rocks. Lead and zinc often cut the coal beds in their vertical veins.

The Potsdam Sandstone rests nonconformably upon the Azoic stratified slates of Pilot Knob. Hence Pilot Knob.

Prof. E. W. HILGARD inquired of Prof. Swallow whether the chalky siliceous beds in southeastern Missouri, conjectured to be of cretaceous age, did not occasionally contain grains of glauconite, black sand and obscure casts of shells.

Upon Prof. Swallow replying in the affirmative, Prof. HILGARD stated that while such materials were altogether foreign to the Cretaceous beds of the adjoining states of Arkansas, Tennessee and Mississippi, a narrow